Moon

Lesson 5 – Relative Size and Distance to the Moon

Relative Size and Distance to the Moon

Grade Level: 6th –12th

Objectives:
- Create a model of Earth-Moon system
- Compute relative sizes of the Earth and The Moon and the distance between them

Arizona State Standards:
- **1SC-P2.** Compare observations of the real world to observations of a constructed model. **PO 1.** Assess the capability of a model to represent a "real world" scenario.
- **1M-P2.** Construct, interpret, and demonstrate meaning for real numbers and absolute value in problem solving situations. **PO 3.** Solve real-world distance problems using absolute value.

Time needed: 1 class period

Introduction:
We look up at the Moon, Earth's nearest celestial neighbor, practically every evening. Sometimes the Moon even appears to change sizes. However, this is just the result of the relative positions of the Earth and Moon in their orbits. Our Moon is the largest moon in the solar system relative to its parent planet. It is 0.273 times the size of the Earth. Earth is approximately 12,756 km in diameter and the Moon is 3,479 km in diameter. The Moon is 384,000 km away from the Earth. How big is the Moon compared to the Earth? How far away is 384,000 km? This lesson put these numbers in perspective give students a better understanding of relative sizes of planetary objects and the immense distances that separate them.

Materials:
- 2 different colored clays per group (play dough recipe included)
- Metric ruler, tape measure, or meter stick
- Calculator

Procedure:
- Give students the diameters of the Moon and Earth and the distance to the Moon from Earth, or write them on the board
- Pass out the bags of clay, measuring stick, and calculator
- The students must now design a **scale model** of the Earth-Moon system. The sizes of the Earth and Moon and the distance between them must be to scale
- They must first design a scale, in metric units, to use in their model.
  Example: 1 cm = 2000 km or
          1 cm = 1000 km
- Have them create their model and check it for accuracy

Assessment:
Have students answer the following question and turn it in. They may work in groups or individually.

Question: If it took the astronauts approximately 79 hours to get to the Moon, how long would it have taken for them to get to Mars traveling at the same speed? (Assume that Mars was at the position in its orbit where it is the closest to Earth, 54,000,000 km).

Extension:
Use the same scale for Jupiter and its moons or Mars and its moons.

Vocabulary:
Scale model

Additional Resources:
http://ic.arc.nasa.gov/ic/projects/bayes-group/Atlas/size/Moon/
http://www.astro.queensu.ca/~hanes/p014/Notes/Topic_009.html
http:// www.freemars.org/jeff/planets/Luna/Luna.htm
http://www.astro.washington.edu/labs/eratosthenes/rung1.html
http://nssdc.gsfc.nasa.gov/photo_gallery/photogallery-Moon.html
http://www.ceeo.tufts.edu/sensors/Moon/size.asp
http://www.pd.astro.it/hosted/PlanetV/planetarium/Moon/L12_07S.html

Play dough Recipe:
1 cup flour
½ cup salt
1 Tablespoon oil
2 teaspoons cream of tarter
1 cup water

Mix all ingredients in saucepan. Heat on low, stirring constantly until dough is evenly mixed and forms a ball. Knead slightly. Store in an airtight container or plastic baggie.